CLAIMS

1. An optical clean-up filter with a desired spectral response, which comprises a plurality of tapered fiber filters concatenated in line on a single-mode optical fiber, said tapered fiber filters having specific wavelength response designs which closely match corresponding specific simulated responses resulting from a decomposition by means of a computer program or algorithm of the desired spectral response into individual specific simulated responses, whereby the in-line concatenation of said tapered fiber filters with responses of various specific designs produces the desired specific response in the clean-up filter.

2. An optical clean-up filter according to claim 1, in which the tapered fiber filters that are produced to match simulated responses with amplitudes of less than 3 dB have a tapered profile with a central beating region and a taper slope such as to minimize higher order modulation in the resulting responses.

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~~3. An optical clean-up filter according to claim 1, in which the tapered fiber filters that are produced to match simulated responses with amplitudes of more than 3 dB have a tapered profile with a central beating region and a coupling region at each end of said beating region with a non-adiabatic taper, thereby forming a tapered filter such as to minimize modulation in the resulting responses.~~

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~~4. An optical clean-up filter according to claims 1, 2 or 3 in which the plurality of tapered fiber filters are produced individually and then concatenated with one another by splicing them in-line on a single-mode optical fiber.~~

~~5. An optical clean-up filter according to claims 1, 2 or 3, in which the plurality of tapered fiber filters are produced directly in-line on a single-mode optical fiber.~~

~~6. A method of manufacturing an optical clean-up filter with a desired spectral response, which comprises:~~

~~(a) decomposing the desired spectral response into individual simulated responses using a suitable computer program or algorithm;~~

~~(b) manufacturing tapered fiber filters with parameters that closely match the individual simulated responses; and~~

~~(c) concatenating said tapered fiber filters on a single-mode fiber to produce the optical clean-up filter with a total response that closely matches the desired spectral response.~~

~~7. A method according to claim 6, in which the computer program for decomposing the desired spectral response into individual simulated responses of independent sine waves uses the following equation:~~

$$T = \beta[1-\alpha\sin^2(\lambda-\lambda_0)\pi/\Lambda]$$

~~where:~~

~~T is the optical transmission of the filter,~~

~~α is the amplitude of the filter,~~

~~β is the maximum transmission,~~

λ is the wavelength,

λ_0 is the reference wavelength or center wavelength of the filter, and

Λ is the wavelength period

and the product function for a plurality of such responses is calculated using the following equation:

$$F = T_1 \times T_2 \ldots\ldots\ldots\ldots \times T_N$$

where:

F is the resulting filter function of the concatenation of the tapers that have the independent transmissions T_1 to T_N.

8. A method according to claims 6 or 7, in which the tapered filters are manufactured separately to match individual simulated responses and then are concatenated in-line by splicing them on a single-mode fiber.

9. A method according to claims 6 or 7, in which the tapered filters are produced in-line on the same single-mode filter to match the individual simulated responses.

10. A method according to any one of claims 6 to 9, in which, upon their manufacture, the tapered fiber filters are bonded to a substrate and packaged in a protective packaging.